

## BUTYL: The Good, The Bad and The Ugly

Spacer companies are poised for a manufacturing showdown, and butyl products are the black-hatted cowboys — indicted on charges of holding hostage almost all their spacer-desiccant in a helpless, sticky grip, and for just plain falling down on the job in the noon-day sun.

In short, butyl kills unit-performance, when corralled in an airspace, much of the time as a result of the one outstanding IG quality the material does have, that being its excellent gas-retention and vapor-barrier properties.

"In fact, hot melt butyl is the backup sealant of choice for our own silicone-foam Super Spacer products," says Jim Kreiner, vice-president, research and development, with Edgetech's parent, Lauren International.

"Along with poly-isobutylene (PIB), they are the two best options available to IG manufacturers for assuring long-life, seal integrity."

"Unfortunately," says Kreiner, "we're now seeing butyl-derived material being used as desiccant-carrying, edge-seal spacers — products such as the Biver system from France's St. Gobain, and in the U.S., Tremco's Swiggle Strip/Seal and the Insul-Dri butyl desiccant used with the Intercept system."

"In terms of polymer science, this is just indefensible," says Kreiner, a veteran chemist from the tire industry, who holds four degrees including a Ph.D. in polymer science from the University of Akron.

"In some important ways, IG units are very much like car tires," notes Kreiner, "In terms of gas retention, for example, the addition of a thin layer of butyl rubber allows a tire to hold its air much longer," he says. "Butyl was a big factor in the development of tubeless tires, so it's no wonder then, that, as a barrier sealant, it's been such a big boon to IG makers."

However, the exact same properties that make butyl such a good air and moisture sealant, make it a very poor desiccant matrix, says Kreiner. When it comes to actually seeing the difference, an electron microscope and 1,000-fold enlargement of Tremco's Swiggle Strip (top picture) clearly shows butyl smothering the molecular sieve. The small white specks highlight how little active desiccant there really is in the product.

By contrast, in the silicone-foam enlargement (bottom picture), large, white desiccant crystals are clearly visible as are the dark passages in the foam that allow moisture vapor to quickly penetrate into the spacer voids.

"Permeable silicone foam is very desiccant-friendly," adds Kreiner, making it ideal for IG spacer use. And this starts paying off from the moment an IG unit is built, he says, because "Even on the coldest winter days, Super Spacer units can be shipped immediately, without any

concern of low-e condensation, while butyl-spacer units have to be stored some time before shipping."

Certainly, such evaluations didn't slip the attention of Edgetech's silicone manufacturer, Dow Corning STI, who recently bestowed a Creative Excellence Award on the company for successfully commercializing the silicone spacer idea. (See Edgetech Newsletter — Summer 1993).

Back on butyl, though, "Its role as spacer mass is a performance nightmare come true," says Edgetech technical director, Michael Glover. "It's soft and tar-like when hot, and hard and rigid when cold. Just how far away can structural failure really be," he asks?

"Field reports say butyl spacers don't stand up under heat in sloped glazing applications," states Glover. "And in the noon day sun, you can forget it."

"Butyl products have a long and sorry history of bubbling and blistering, especially in south and west facing high performance windows," he says, "and they've also been known to delaminate and sag in spacer designs, where butyl is applied to metal

spacers."

"Silicone foam Super Spacer, on the other hand, can take any amount of heat you want to throw at," he points out, "It'll never bubble or blister."

As a thermoplastic material, "Butyl exhibits cold flow properties with the resulting problems of cold creep and spacer bar migration," explains Glover. "Another IG disaster just

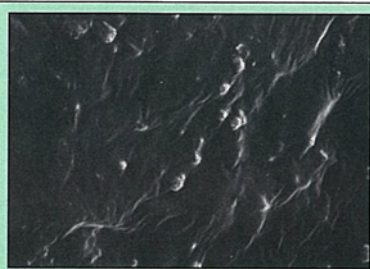
waiting to happen."

"That's why, when we employ butyl, we do so in a reverse dual seal design. Our pre-applied adhesive, plus Super Spacer itself, form the structural sealant, and then we gun butyl around the outer edge, just where such an excellent barrier seal should logically be."

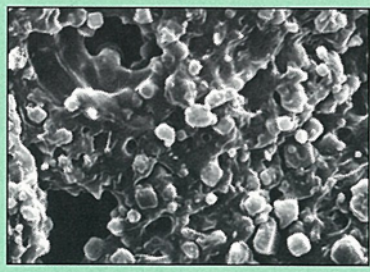
Hidden from sight, butyl sealants are protected from heat build-up and UV degradation, and in combination with a structural foam spacer, there are no cold-flow concerns. Just as important, Glover adds, "Flexible foam spacers minimize butyl-seal stresses, that can cause adhesive loss at extremely cold temperatures."

While some polymer science can show up butyl's good and bad points, says Glover, only its appearance in the airspace of a brand new window can truly show off its unsightliness.

"It's just plain ugly, and considering how much effort manufacturers put into making their windows and doors aesthetically pleasing, these days, it's not too surprising that many are now beginning to wonder, just how the window-buying public will feel about an ugly, bumpy spacer — only available in black."



Electron microscopic enlargements of a butyl spacer (above) and a silicone foam spacer (below)



## Edge Notes

### SIGMA kicks off own U-value study

The Component Quality and Performance Committee of the Chicago-based Sealed Insulating Glass Manufacturers' Association has begun its own effort at establishing a standardized methodology for calculating and comparing IG U-values.

Presently, the only standard industry has to assess IG energy performance is center-of-glass, and "That's hopelessly outdated," says Edgetech window analyst, David Sargent, "particularly in light of the window U-value ratings the NFRC has developed."

The National Fenestration Rating Council's thermal performance criteria is a weighted composite, based on center-of-glass, edge of-glass and window frame characteristics. "This is great if your selling windows," says Sargent, "but it's frame-specific, and doesn't really provide IG manufacturers with a useful tool for comparing their own product's performance."

Some industry spokesmen see SIGMA's consensus-achieving effort as a long one, but delays could be prevented by encouraging

research division. "Alert people that it's going on," he says and "I think it will eventually provide good information to the IG industry."

### TFB bent on Super-U

Users of Super-U, Edgetech's high-performance, rigid spacer system, will soon have another equipment option available, as industry leader, Tools For Bending Inc. of Denver, Colorado, has begun developing the necessary equipment package.

"We can make the (Super-U) material work on our bender relatively easily," says TFB spokesman, Joe Alley. "It'll require some software and a notching system", but this is not rocket science, he explains.

Accommodating a silicone-foam-wrapped, metal spacer to TFB's existing, metal-bending line is a challenge the company has accepted in response to demand for automated, Super-U equipment from some major IG producers, says Alley. "It's definitely the wave of the future," he notes, "a boat we've got to jump on."

### Cushion Edge notcher

Edgetech has developed a two-headed, hand-held, notching tool to speed up application of Cushion Edge, the company's specialty spacer for triple-pane art glass and decorative door lites.

The U-shaped silicone foam spacer is designed to wrap around delicate center lites to cushion them from thermal and mechanical stresses, "And compared to triple decorative-lite assembly, you save on assembly time with this one-piece spacer system," says Edgetech technician, Ray Pek.

"It's essentially a two-cutter version of the widely-used, Super Spacer hand-notcher," he explains, "and because the new tool has a nylon cutting block which inserts into the Cushion Edge groove, it's just as easy to use."

A robust implement, Cushion Edge Notcher costs \$50 (US) and can be ordered directly from Edgetech.